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The genus *Schistostoma* Becker from southern Africa, with an evaluation of its generic status (Diptera: Dolichopodidae *s. l.*: Microphorinae)

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ABSTRACT

Two new species of the genus *Schistostoma* Becker are described from southern Africa: *S. brandbergensis* sp. n. and *S. kalkgat* sp. n. The validity of recognising *Schistostoma* as a distinct genus is re-investigated and confirmed. *S. albopilosum* (Becker), comb. n., is transferred from *Microphor* Macquart to *Schistostoma*. Within *Schistostoma*, a new species group is proposed. The phylogeny and distribution of *Schistostoma* are briefly discussed.

KEY WORDS: Diptera, Empidoidea, Dolichopodidae, *Schistostoma*, new species, Mediterranean, Namibia, South Africa, taxonomy.

INTRODUCTION

The genus *Schistostoma* Becker, 1902 (with *S. eremita* Becker as the type species) currently includes 19 species distributed almost exclusively in the northern hemisphere (Palaearctic – 15; Nearctic – 3; Afrotropical – 1) (Chvála 1987, 1991; Shamshev 1991, 1993). The species of this genus are quite small, greyish flies occurring in southern areas and inhabiting sandy biotopes. The genus was formerly classified within the family Microphoridae (Chvála 1983), but this family group is currently transferred to the Dolichopodidae *s.l.* (Sinclair & Cumming 2006). Prior to this study, a single African species of *Schistostoma* (*S. stuckenbergi* Chvála, 1991) was known from Western Cape, South Africa.

This paper was initiated by the discovery of two undescribed species of *Schistostoma* from southern Africa. An examination of these species led us to question the validity of recognising *Schistostoma* as a distinct genus. To resolve this problem, all available species of *Schistostoma* and some species of *Microphor* Macquart, 1827 (a closely related genus) were re-examined, with special reference to the characters of the male and female terminalia. Our study has confirmed that *Schistostoma* definitely can be distinguished from the genus *Microphor* and thus deserves generic status.

MATERIAL AND METHODS

This study is based on Diptera housed or deposited in the Natal Museum (Pietermaritzburg, South Africa) [NMSA], National Museum of Namibia (Windhoek, Namibia) [NMN], Royal Belgian Institute of Natural Sciences (Brussels, Belgium), Zoological Institute of Russian Academy of Sciences (St. Petersburg, Russia) and Zoologisches Forschungsmuseum Alexander Koenig (Bonn, Germany) [ZFMK]. Only pinned specimens were studied.

Terms used for adult structures primarily follow those of McAlpine (1981), although the terminology for the antenna is taken from Stuckenberg (1999). Homologies for the male terminalia follow Sinclair (2000*a*). To facilitate observations, some parts of the body were macerated in hot 85% lactic acid and immersed in glycerine. Drawings of morphological features were made with a camera lucida attached to a compound microscope. In describing the hypopygium, 'dorsal' and 'ventral' refer to the position prior to genital rotation and flexion. Figures showing the male genitalia in lateral view are oriented as they appear on the intact specimen (rotated and lateroflexed to the right).

TAXONOMY

Schistostoma albopilosum group

Diagnosis: This new species group is characterised by pubescent eyes, modified male midleg and a shortened hypandrial lobe fused to the epandrium basally.

Remarks: This group currently includes *S. albopilosum* from southern Europe and three southern African species, *S. brandbergensis* sp. n., *S. kalkgat* sp. n. and *S. stuckenbergi*. Justification of this species group is given under 'Discussion'.

Key to species of the *Schistostoma albopilosum* group

1 Male 2
– Female 5

2 Hind tibia somewhat tapered toward apex, bearing 1 row of dorsal bristles on apical half with 3 or 4 subapicals long and strong. Mid tibia with dorsal subapical spinule-like setae, tuft of similar ventral setae before excision and ventral spinules at apex (Knersvlakte, Namaqualand) .... **kalkgat** sp. n.
– Hind tibia slender, with ordinary setation. Mid tibia with different armature 3

3 Proboscis half as long as head height. Acrostichals biserial throughout. Mid tibia with some spinules beyond excision (Brandberg Massif) .... **brandbergensis** sp. n.
– Proboscis as long as head height. Acrostichals 3- or 4-serial in middle part of scutum. Mid tibia with different armature beyond excision 4

4 Style about twice as long as postpedicel. Mid tibia with 2 short flattened bristles beyond excision (Kamiesberg, Namaqualand) .... *stuckenbergi* Chvála
– Style about as long as postpedicel (usually somewhat longer). Mid tibia with 3 strong brownish bristles beyond excision (Mediterranean) .... *albopilosum* (Becker)

5 Acrostichals biserial 6
– Acrostichals 3- or 4-serial 7

6 Proboscis somewhat longer than head height .... **kalkgat** sp. n.
– Proboscis half as long as head is high .... **brandbergensis** sp. n.

7 Abdomen with black setation .... *stuckenbergi* Chvála
– Abdomen with whitish setation .... *albopilosum* (Becker)

Schistostoma albopilosum (Becker, 1910), **comb. n.**

Fig. 1

Microphorus albopilosus: Becker 1910: 644. Type locality: Corsica (Chvála 1986: 444, figs 9, 28–33 (*Microphor*)).

Description:

Fully re-described by Chvála (1986: 444). The description of the terminalia of both sexes is updated as follows:

Male terminalia (Figs 1A–C). Left epandrial lamella quadrate with short knob-like process posterior to surstylus; right lamella subrectangular. Left surstylus slender, finger-like, bearing some setulae, with hooked tip and expansion near mid-length; right surstylus broadly expanded and rounded with short pointed knob-like process. Hypandrium fused basally to each epandrial lamella; prolonged from broad base, gradually tapered to broad rounded apex, bearing pair of apical setae, less than one-third length of hypandrium; apex one-third of basal width of hypandrium. Phallus sickle-shaped with slender digitiform apex. Left postgonite digitiform, folded medially beyond epandrial lobe; apex rounded, right postgonite long, flat, closely appressed to inner face of epandrial lamella, tapered to point. Cercus short, bilobed, bearing several long setae.

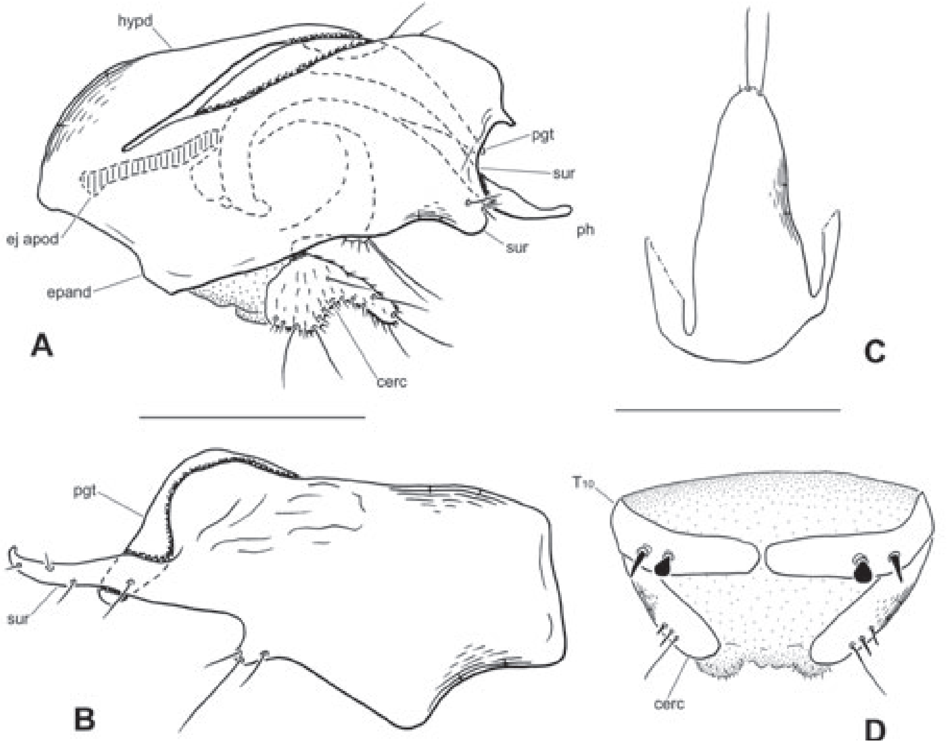

Fig. 1. *Schistostoma albopilosum* (Becker): (A) Hypopygium, right lateral view; (B) Hypopygium, hypandrium and cercus removed, left lateral view; (C) Hypandrium, dorsal view; (D) Apical part of female terminalia, dorsal view. Abbreviations: cerc – cercus; epand – epandrium; ej apod – ejaculatory apodeme; hypd – hypandrium; pgt – postgonite; ph – phallus; sur – surstylus; T – tergite. Scale bars = 0.1 mm.

Female terminalia (Fig. 1D). Tergite 10 divided medially, bearing 2 pairs of stout setae (acanthophorites); outer pair of setae more slender and pointed, inner setae peg-like with rounded apex. Cercus shorter than width of tergite 10, rounded apically, bearing several slender subapical setae.

Material examined: TURKEY: *Antalya Prov.*: 15♂ 2♀ Phaselis, 10 km S Kemer, 0 m, 27.iv.2000, B. Merz & Senay leg.; 9♂ 12♀ Side (= Selimye), 2.v.2000, 0 m, B. Merz & Senay (ZFMK).

Distribution and seasonal occurrence: This species is known from Spain, Corsica, Sicily, Greece and Turkey, from April to June.

Remarks: This species has been collected on a sandy boggy shoreline (in the same place as *Epithalassius* Mik, Dolichopodidae *s.str.*) at the end of June (Corsica). The material examined in this study from Turkey represents a new country record. These specimens were collected on sand dunes covered partly with vegetation, some 100 m behind the beach (Merz, pers. comm. 2006).

Chvála (1986) indicated that the syntypic series of this species is deposited in Becker's Collection in Berlin, but a lectotype has not been designed.

Schistostoma brandbergensis sp. n.

Fig. 2

Etymology: The new species is named after its type locality, the Brandberg Massif.

Diagnosis: Hind tibia slender, with unmodified setation; proboscis nearly half as long as height of head; thorax mainly with black setation, acrostichals biserial, dorsocentrals uniserial; abdomen mostly with pale stiffened hairs.

Description:

Male.

Body black in ground-colour. Eyes holoptic, upper ommatidia considerably enlarged, ommatrichia present, distinct, but not dense. Occiput densely greyish pollinose, mostly clothed with black bristles, with some pale hairs in lower part; almost bare in upper part, except for postoculars. Ocellar tubercle with 2 pairs of proclinate bristles, anterior pair somewhat longer, posterior pair inserted at posterior margin. Antenna black; pedicel ringed with circlet of subequally short subapical bristles; postpedicel short conical, nearly 2.5 times longer than wide, pubescent with microtrichia; style somewhat paler in apical half, at most 1.5 times longer than postpedicel. Proboscis black, moderately long, nearly half as long as height of head, directed forward; palpus black elongate ovate, nearly half-length of labrum, pubescent with microtrichia and bearing scattered black setulae.

Thorax largely greyish pollinose, mainly with black setation; subshining in some views, with 2 darker subshining (viewed dorsally) vittae down dorsocentral rows and some brownish tinge down acrostichal rows; pleurae somewhat paler pollinose. Prothoracic episterna with 1 to several yellowish bristles. Postpronotal lobe with 1 long brownish bristle and 2 or 3 shorter brownish bristles anteriorly. Mesonotum with 1 presutural supra-alar, 2 notopleural (with additional shorter bristles varying in number and position), 2 or 3 short postsutural supra-alar, 1 long postalar and 4 similar scutellar bristles. Acrostichals arranged in 2 regular rows, rather short, lacking on prescutellar depression. Dorsocentrals uniserial, mostly subequal in length to acrostichals, 3 pre-

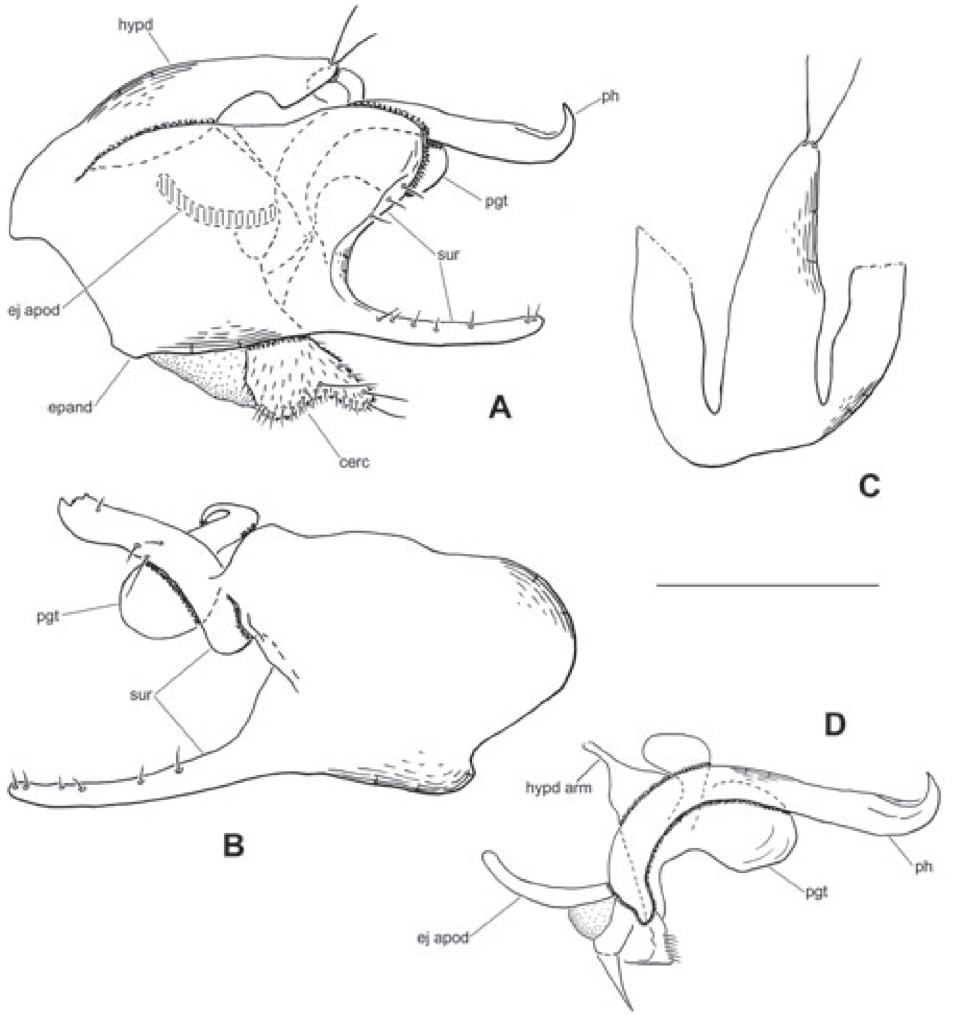

Fig. 2. *Schistostoma brandbergensis* sp. n.: (A) Hypopygium, right lateral view; (B) Hypopygium, hypandrium and cercus removed, left lateral view; (C) Hypandrium, dorsal view; (D) Phallus and internal structures, right lateral view. Abbreviations: cerc – cercus; epand – epandrium; ej apod – ejaculatory apodeme; hypd – hypandrium; hypd arm – hypandrial arm; pgt – postgonite; ph – phallus; sur – surstylus. Scale bar = 0.1 mm.

scutellar pairs (especially posterior pair) considerably longer; 2 or 3 anterior pairs laterally off set from row. Anterior spiracle black.

Legs almost wholly dark brown to black, with intermixed pale to black setation; knees, extreme apex of femora and extreme base of tibiae yellowish; largely greyish pollinose, hind femur broadly shining posteriorly. Coxae and trochanters with ordinary brownish to yellow preapical bristly hairs. Fore femur slender, with some longer posterodorsal bristles, as long as two-thirds width of femur; shorter posteroventral bristles (subapicals longer) present. Fore tibia unmodified, mostly with inconspicuous setation, dorsal setulae somewhat longer. Fore tarsus unmodified, with ordinary setation. Mid femur with moderately long yellow posteroventral bristles, nearly as long as width of femur; similar black antero- and posterodorsal bristles (especially apically), bearing 1 long anterior bristle near middle. Mid tibia modified, somewhat curved and more stout in apical half, with shallow ventral excision near apex, with 1 row of moderately long posterodorsal bristles, 1 row of closely set anterodorsal spinule-like setae in apical third (1 preapical seta longer and spine-like), 1 row of yellowish posteroventral setae (longer in apical half), brush of about 7 strong setae of different lengths proximal to excision and some spinules beyond excision. Mid tarsus unmodified, tarsomere 1 with 1 long ventral bristle near base. Hind femur slender, with 1 row of mainly equally short anteroventral bristles (about 6 subapical bristles considerably longer) and 1 row of moderately long dorsal bristles, subequal in length to width of femur. Hind tibia slender, with somewhat longer dorsal setulae. Hind tarsus unmodified, with unmodified setation.

Wing (length 2.5–2.6 mm) hyaline, with brownish normally sclerotised veins, covered with uniform microtrichia. Basal costal bristle black, long. All veins complete. Costa with short setulae along anterior margin, distinct throughout; upper surface with distinct dorsal spinulae. Stigma pale brown, positioned along costa between veins Sc and R_1. Squama pale brownish, with pale hairs. Halter with yellow knob and dark brown stem.

Abdomen with tergites concolorous with mesonotum, mostly clothed with pale bristly hairs longer laterally; sternites somewhat paler, mostly with scattered short pale hairs, sternite 8 with 5–7 strong black bristles. Male terminalia (Figs 2A–D): Epandrium with pair of slender, finger-like dorsal lobes (dorsal part of surstylus), bearing some setulae, slightly arched; right lamella oblong, left lamella quadrate. Left ventral surstylus with digitiform extension; apex with toothed margin; right ventral surstylus broadly expanded and rounded apically. Hypandrium fused basally to each epandrial lamella; prolonged and slightly tapered anteriorly, bearing pair of apical setae, less than one-third of length of hypandrium; apex one-third basal width of hypandrium. Phallus sickle-shaped with hooked tip. Postgonite arising from pair of hypandrial arms which fuse above base of phallus, articulated to subepandrial sclerite and phallus; right postgonite shorter than surstylus, tapered apically; left surstylus broadly rounded apically, longer than right surstylus, arched medially and dorsally over phallus, base of postgonite strongly recurved or spiralled. Cercus short, bilobed, bearing several setae.

Female.

Similar to male, except as follows: eyes dichoptic, ommatidia uniform. Frons broad, with rather long marginal setae. Mid tibia unmodified, mid tarsomere 1 with unmodified setation. Abdomen with somewhat shorter and darker setation. Terminalia completely enclosed in abdomen.

Holotype: ♂ 'Namibia: BRANDBERG/ Mason Shelter/ 21°04'39"S 12°05'43"E/ 05–14.iii.2002, 1750 m/ A.H. Kirk-Spriggs & E./ Marais/ Malaise trap riverbed'; 'HOLOTYPE/ *Schistostoma/ brandbergensis/* Shamshev & Sinclair' (NMN).

Paratypes: 1 ♂ 1 ♀ with same data as holotype (NMN).

Distribution and seasonal occurrence: Known only from type locality in Namibia and collected at the beginning of March, during the summer rainy period. The type series was not collected during the initial Brandberg Inventory Project (Marais & Kirk-Spriggs 2000; Sinclair 2000*b*, 2003), but obtained in a subsequent expedition, as described by Mey (2003). The type locality, Mason Shelter is a plateau surrounded by rugged hills and smooth granitic boulders (Mey 2003, figs 3, 4, 7; 2004, figs 3, 4). The Malaise trap was set along well-vegetated ephemeral watercourses (Kirk-Spriggs, pers. comm. 2006). There were temporary pools present when the expedition arrived, indicating that it had rained earlier, and heavy rains occurred during the time the trap was set. Mason Shelter is the upper drainage area of the Nawuarib River (Mey 2004).

Schistostoma kalkgat sp. n.

Fig. 3

Etymology: The new species is a noun in apposition, named after the farm where the trap was established.

Diagnosis: Hind tibia somewhat tapered toward apex, bearing 1 row of dorsal bristles on apical half with 3 or 4 subapicals long and strong. Mid tibia with dorsal subapical spinule-like setae, tuft of similar ventral setae before excision and ventral spinules at apex.

Description:

Male.

Body black in ground-colour. Eyes holoptic, upper ommatidia considerably enlarged, border between upper and lower ommatidia distinct, ommatrichia present, distinct. Occiput yellowish grey pollinose, clothed with brownish yellow bristles, with some pale hairs on lower part; almost bare on upper part, except postoculars. Ocellars missing. Antenna black; pedicel ringed with circlet of subequally short subapical setae; postpedicel short conical, 2.3 times longer than wide, pubescent with microtrichia; style partly missing. Proboscis long, somewhat longer than head height, apparently directed forward, labrum largely yellowish brown, paler proximally. Palpus black, elongate ovate, considerably shorter than labrum, pubescent with microtrichia and bearing scattered black setulae.

Thorax largely greyish pollinose, mainly with yellowish brown setation; subshining in some views, with 2 darker subshining (viewed dorsally) vittae down dorsocentral rows; pleurae somewhat paler pollinose (bristles mostly lost during processing malaise trap material). Prothoracic episterna with 1 yellowish bristle. Postpronotal bristle missing, postpronotal lobe with 6 subequally long pale bristly hairs. Mesonotum with 1 presutural supra-alar surrounded by additional shorter and paler bristly hairs, 2 notopleural bristles, accompanied by additional shorter bristly hairs varying in number and position, 2 or 3 short postsutural supra-alar, 1 postalar (missing) and 4 scutellar (3 missing) bristles. Acrostichals arranged in 2 regular rows (at least in anterior part of scutum, otherwise missing), moderately long. Dorsocentrals irregularly biserial in anterior part of scutum, otherwise missing, subequal in length to acrostichals.

Legs almost wholly brownish, with intermixed pale to black setation; femora somewhat darker, knees, extreme apex of femora and extreme base of tibiae paler (especially on fore legs); largely greyish pollinose, hind femur broadly shining posteriorly. Coxae and trochanters with ordinary brownish preapical yellow bristly hairs. Fore femur slender, with some longer posterodorsal bristles, bearing short posteroventral setae (subapicals longer). Fore tibia simple, with inconspicuous setation. Fore tarsus unmodified, with simple setation. Mid femur with moderately long yellow posteroventral

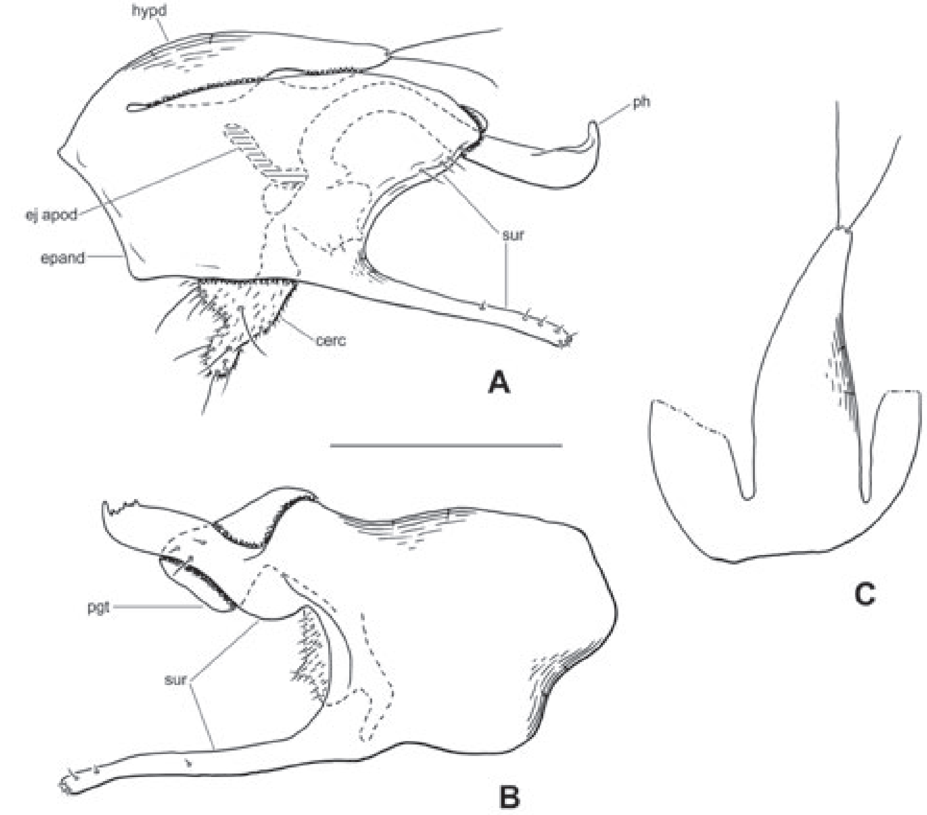

Fig. 3. *Schistostoma kalkgat* sp. n.: (A) Hypopygium, right lateral view; (B) Hypopygium, hypandrium and cercus removed, left lateral view, (C) Hypandrium, dorsal view. Abbreviations: cerc – cercus; epand – epandrium; ej apod – ejaculatory apodeme; hypd – hypandrium; pgt – postgonite; ph – phallus; sur – surstylus. Scale bar = 0.1 mm.

bristles, similar antero- and posterodorsal bristles (especially apically), bearing 1 long anterior bristle near middle. Mid tibia modified, somewhat curved and more stout on apical third, with shallow ventral excision near apex, bearing some black dorsal subapical spinule-like setae, tuft of similar ventral spinule-like setae before excision and some ventral spinules at apex. Mid tarsus unmodified, tarsomere 1 with 1 long ventral bristle near base. Hind femur slender, with 1 row of mainly equally short anteroventral bristles (3 or 4 subapical bristles longer) and 1 row of rather long dorsal bristles. Hind tibia somewhat tapered toward apex, with 1 row of black dorsal bristles in apical half (3 or 4 subapicals long and strong), covered with dense appressed setulae posteriorly near apex. Hind tarsus unmodified, with simple setation.

Wing (length 2.7 mm) hyaline, with brownish normally sclerotised veins, covered with uniform microtrichia. Basal costal bristle moderately long, brownish yellow. All veins complete. Costa with short setulae along anterior margin, distinct throughout; upper surface with distinct dorsal spinulae. Stigma brownish yellow, positioned along costa between veins Sc and R_1. Squama pale brownish, pale hairs. Halter with yellow knob and brown stem.

Abdomen with tergites concolorous with mesonotum, clothed with pale to brownish bristly hairs longer laterally; sternites with scattered short hairs. Male terminalia (Figs 3A–C): Epandrium with pair of slender, finger-like dorsal lobes (part of surstylus), bearing some setulae, mostly straight; right lamella oblong, left lamella quadrate. Left ventral surstylus with digitiform extension; apex with toothed margin; right surstylus broadly expanded and rounded apically. Hypandrium fused basally to each epandrial lamella; prolonged and distinctly tapered anteriorly, bearing pair of apical setae, less than one-third length of hypandrium; apex one-fourth of basal width of hypandrium. Phallus sickle-shaped with hooked tip. Postgonite arising from pair of hypandrial arms which fuse above base of phallus, articulated to subepandrial sclerite and phallus; right postgonite shorter than surstylus, tapered apically; left surstylus broadly rounded apically, longer than right surstylus, arched medially and slightly ventrally beneath phallus, base of postgonite strongly recurved. Cercus short, bilobed, bearing several setae.

Female.

Similar to male, except as follows: Eyes dichoptic, ommatidia uniform, bare. Frons broad, with rather short marginal setae. Mid and hind tibiae unmodified, mid tarsomere 1 with simple setation. Wing length 2.1 mm. Abdomen with somewhat shorter setation. Terminalia enclosed in abdomen.

Holotype: ♂ 'S.AFR:West CapeProv./ Knersvlakte (east of/ Vanrhynsdorp) Farm/ Kalkgat Noord'; 'S 31°07'30"/ E 18°55'30"; malaise/ 20–27.ix.2000/ U. Schmiedel leg.'; 'HOLOTYPE/ *Schistostoma*/ *kalkgat*/ Shamshev & Sinclair' (NMSA).
Paratype: ♀ with same data as holotype (NMSA).

Distribution and seasonal occurrence: This species is known only from Western Cape, South Africa, collected at the end of September. The type locality is in the Knersvlakte of southern Namaqualand, a region that receives reliable winter rainfall (May to August) of between 100 and 175 mm (Cowling *et al.* 1999; Schmiedel & Jürgens 1999). The Knersvlakte is one of three centres of plant endemism in Namaqualand (Cowling & Pierce 1999). The region consists of a rolling coastal plain, bordered in the west by the Atlantic Ocean, the Hardeveld uplands to the north and the Cape Fold Belt in the east (Schmiedel & Jürgens 1999). The major vegetation surrounding the type locality is Lowland Succulent Karoo, a dwarf succulent and species-rich shrubland (Cowling *et al.* 1999). The material was collected in Malaise traps as a part of the BIOTA Southern Africa Project (Fig. 4).

Schistostoma stuckenbergi Chvála, 1991

Schistostoma stuckenbergi: Chvála 1991: 20, figs 1–4, 6–12. Type locality: South Africa.

Description: Fully described by Chvála (1991).

Distribution and seasonal occurrence: This species also occurs in Namaqualand (Kamiesberg uplands), collected at Studers Pass on the western face of Rooiberg Mountain (Chvála 1991). The series was collected from a small swarm over pools of a headwater stream. The Kamiesberg bioregion is quite a wet area for Namaqualand and receives 200–400 mm annual rainfall (Cowling *et al.* 1999) and is a recognised centre of plant endemism in Namaqualand (Cowling & Pierce 1999). The specific area where this species was collected is an isolated high rainfall patch, with few succulents (probably Renosterveld according to Cowling's pers. comm., 2006).

DISCUSSION

The genus *Schistostoma* was originally proposed for a species from Egypt, whose whitish pubescent representatives have a deeply cleft mouth (Becker 1902). Doubt about its generic status occurred due to the discovery of white haired *Microphor* forms and black *Schistostoma*. This led Becker (1909) to later lower *Schistostoma* to a subgenus of *Microphor*, which was also followed by Melander (1928). The subsequent generic assignment and taxonomic history of *Schistostoma* remains complex and has been reviewed by Chvála (1987).

The key diagnostic characters of both genera are compared in Table 1. For the recognition and definition of empidoid genera, we have always maintained the value of distinct external characters present in both sexes. For example, if *Microphor* and *Schistostoma* are not consistently distinguishable on the basis of external characters, perhaps it is best not to recognise them as separate genera. It does appear that the number of scutellar bristles is a distinct character, which occurs in both sexes and can be utilised for distinguishing these two genera anywhere in the world. This is quite valuable, considering that the male and female genitalia also appear to be distinct for each genus. For this reason we will continue to recognise both genera, and perhaps a revision of the Nearctic fauna will help to confirm our conclusions.

The Southern African species are characterised by distinct ommatrichia (pubescence eyes) and a shortened hypandrial lobe fused to the epandrium basally. This narrow median lobe is clearly homologous to what Chvála (1987) referred to as the opisthypandrium, because of the presence of a pair of preapical bristles, and this lobe is not produced laterally as in *Microphor*. In addition, the male midleg bears secondary sexually modified bristles. In our search of probable relationships, we were surprised to discover that *M. albopilosus* Becker also possesses pubescent eyes and a modified midleg (see Chvála 1986, fig. 9). Examination of material led us to the discovery that this *Microphor* species possesses male (hypandrial lobe bearing pair of setae and fused to epandrium) and female genitalia (acanthophorites present) characteristic of *Schistostoma* (see outline in Table 1). Consequently, this species is now regarded as *S. albopilosum* (Becker), comb. n.

TABLE 1

Comparison of the genera *Schistostoma* and *Microphor*.

Characteristic	***Schistostoma***	***Microphor***
cleft of clypeus	variable	variable
length of proboscis	variable	variable
colouration of bristles	variable	variable
number of scutellar bristle pairs	1 or 2	3 or 4
prolongation of hypandrium	extension clearly separated (‘opisthypandrium’), bearing pair of setae	not separated or extending beyond epandrium; apex lacking pair of setae; extended laterally, not medially
female terminalia – acanthophorites	acanthophorite bristles – stout, spine-like	acanthophorite bristles – slender, bristle-like
female tergite 10	divided	undivided
female cercus	upcurved (in dried specimens sclerites of segment 6 are closed, hiding the cerci)	straight (in dried specimens, sclerites of segment 6 are open, with the long cerci clearly produced)

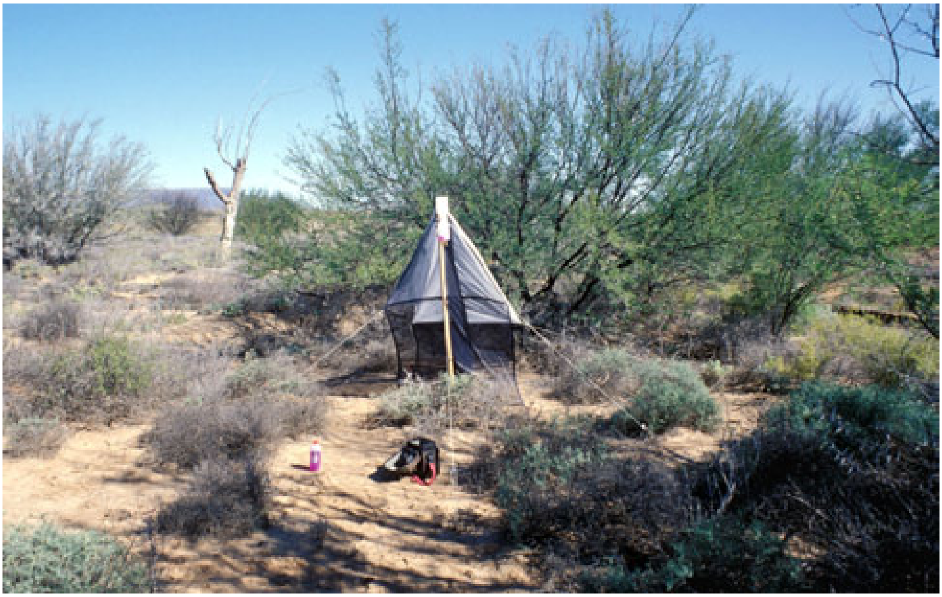

Fig. 4. Acacia Karoo stand on the farm Kalkgat Noord (*C. kalkgat* type locality), in the north-eastern Knersvlakte, October 2000. Photograph by Ute Schmiedel.

Apparently Chvála (1986) did not dissect female exemplars, and the male terminalia he illustrated clearly differ from all other European species. Apart from the male terminalia, a clue to its mistaken generic assignment in Chvála's redescription is in the presence of only two pairs of scutellar bristles and female cerci concealed (see Table 1).

Chvála (1987) defined two species groups in *Schistostoma*, *S. truncatum*- and *S. eremita*-groups. All southern African species (*S. stuckenbergi*, *S. brandbergensis* sp. n., *S. kalkgat* sp. n.), together with the Mediterranean species *S. albopilosum* are assigned here to a new species group, the *S. albopilosum*-group. The recognition of this species group supports the concept proposed by Chvála (1991) that the southern African fauna represents a Palaearctic element. This group is defined on the basis of the following characters: eyes pubescent; hypandrium fused basally to both epandrial lamellae, prolonged apically and bearing a pair of apical setae; male midleg modified.

We agree in Chvála's (1991) assessment that the African species (also including the Mediterranean *S. albopilosum*) are a relict group and appear to represent the sister group to all remaining *Schistostoma* on the basis of the weakly developed hypandrial lobe. All African species are closely related on the basis of the very similar male terminalia. The species are more readily distinguished on the basis of external characters.

S. stuckenbergi and *S. brandbergensis* sp. n. are both known from isolated massifs. Although they have been collected in the vicinity of pools of water, we do not consider this the primary breeding habitat (see Chvála 1991 for opposing view), and the species of *Schistostoma* remain associated with warm sandy biotopes. The typical habitat for all southern African *Schistostoma* is likely to be similar to the type locality of *S. kalkgat* sp. n. in the Succulent Karoo Region (Schmiedel & Jürgens 1999) (Fig. 4). In southern Germany, *S. truncatum* (Loew, 1864) is also sometimes found near water, where several specimens were collected by BJS along dry sand and gravel banks of the Isar River.

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